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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.
08/799,506	02/12/97	YAMAZAKI	S 0756-1630

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D1M1/0918

EXAMINER

WILCZEWSKI, M

ART UNIT PAPER NUMBER

1107

DATE MAILED: 09/18/97

Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner of Patents and Trademarks

Office Action Summary

Application No.
08/799,506

Applicant(s)
Yamazaki et al.

Examiner
M. Wilczewski

Group Art Unit
1107



☒ Responsive to communication(s) filed on Feb 12, 1997

☐ This action is **FINAL**.

☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11; 453 O.G. 213.

A shortened statutory period for response to this action is set to expire three month(s), or thirty days, whichever is longer, from the mailing date of this communication. Failure to respond within the period for response will cause the application to become abandoned. (35 U.S.C. § 133). Extensions of time may be obtained under the provisions of 37 CFR 1.136(a).

Disposition of Claims

☒ Claim(s) 8-15, 21-23, 27-29, 35, 36, 41, 42, and 44-54 is/are pending in the application.

Of the above, claim(s) 35 and 36 is/are withdrawn from consideration.

☐ Claim(s) _____ is/are allowed.

☒ Claim(s) 8-15, 21-23, 27-29, 41, 42, and 44-54 is/are rejected.

☐ Claim(s) _____ is/are objected to.

☐ Claims _____ are subject to restriction or election requirement.

Application Papers

☐ See the attached Notice of Draftsperson's Patent Drawing Review, PTO-948.

☐ The drawing(s) filed on _____ is/are objected to by the Examiner.

☐ The proposed drawing correction, filed on _____ is ☐ approved ☐ disapproved.

☐ The specification is objected to by the Examiner.

☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. § 119

☒ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d).

☒ All ☐ Some* ☐ None of the CERTIFIED copies of the priority documents have been
☐ received.

☒ received in Application No. (Series Code/Serial Number) 08/330,797.

☐ received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

*Certified copies not received: _____

☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).

Attachment(s)

☒ Notice of References Cited, PTO-892

☐ Information Disclosure Statement(s), PTO-1449, Paper No(s). _____

☐ Interview Summary, PTO-413

☐ Notice of Draftsperson's Patent Drawing Review, PTO-948

☐ Notice of Informal Patent Application, PTO-152

--- SEE OFFICE ACTION ON THE FOLLOWING PAGES ---

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 8-11, 13, 27-29, 47, and 49 are rejected under 35 U.S.C. 103(a) as being unpatentable over Miyachi et al., U.S. Patent 5,194,398, of record, in view of Pressley, U.S. Patent 4,475,027, newly cited.

Miyachi et al. disclose an apparatus which comprises a film-forming chamber 1 for forming an amorphous semiconductor film and a dehalogenating-hydrogenating chamber 2, see figure 5, for example. The two chambers are combined by a conveying device 13. The substrates 10 move between the two chambers without being exposed to outside air. Note in Example 14 that the dehalogenation-hydrogenation is preferably performed by light irradiation using, for example, an ultraviolet laser, a visible light laser, or a carbon dioxide laser, see column 18, lines 29-43. Miyachi et al. lack anticipation only of using a laser beam having a rectangular form and of moving the substrate during the irradiating step.

Pressley discloses an apparatus which comprises a laser beam having a rectangular form in which the laser beam is scanned by moving the beam relative to the substrate, see column 7, lines 4-9. Since the apparatus of Pressley permits uniform laser irradiation of semiconducting materials, it would have been obvious to one of ordinary skill in the art to use a laser beam

having a rectangular cross-section in the dehalogenating-hydrogenating chamber of Miyachi et al. In addition, it is obvious from the teachings of Pressley that the substrates could be moved with respect to the laser beam in the known apparatus of Miyachi et al.

Claims 21-23 and 48 are rejected under 35 U.S.C. § 103 as being unpatentable over Miyachi et al. In view of Pressley further in view of Yamazaki et al., U.S. Patent 4,888,305, of record.

The Miyachi et al. And Pressley patents are applied as supra. Miyachi lacks anticipation of introducing the laser light through a window provided in the wall of the chamber. Yamazaki et al. disclose an apparatus for photo annealing non-single crystalline silicon films in which light irradiation is carried out by irradiating the interior of a reaction chamber with an excimer laser through a window, see figure 1 and column 2, lines 38-41. Therefore, it would have been obvious to the skilled artisan that the laser light used in the known method of Miyachi could be introduced through a window provided in the wall of the dehalogenating-hydrogenating chamber thereby allowing control of the laser without exposing the substrate to outside air.

Claims 8, 14, and 15 are rejected under 35 U.S.C. § 103 as being unpatentable over Begin et al., U.S. Patent 5,310,410, of record, in view of Miyachi et al. and Pressley.

Begin et al. disclose an apparatus for processing semiconductor wafers which includes satellite reaction chambers 60, 62, 64, and 66 disposed around the periphery of central chamber 14, see figure 1. A robot assembly 16 comprising arms 18, 20, and 22 is disposed in central chamber 14. Assembly 16 moves the substrate 12 to any position within the apparatus.

Begin lacks anticipation only of disclosing that reaction chambers 60, 62, 64, and 66 comprise an irradiation chamber and a vacuum apparatus. However, Miyachi discloses an apparatus which comprises an irradiation chamber (the dehalogenating-hydrogenating chamber) and a vacuum chamber for depositing an amorphous semiconductor layer. Therefore, it would have been obvious to one skilled in the art that the processing chambers of Miyachi et al. could have been used in the known apparatus of Begin. As pointed out in the rejection supra, in light of the disclosure of Pressley, it would have been obvious to one skilled in the art to use a laser beam having a rectangular form which permits uniform irradiation in the known apparatus of Miyachi et al. and to move the substrates with respect to the laser beam.

Claims 41, 42, 44-46, and 50-54 are rejected under 35 U.S.C. § 103 as being unpatentable over Begin et al. in view of Miyachi et al., Pressley, Nakayama et al., of record, and Kawasaki et al., also of record.

Begin et al. disclose an apparatus for processing semiconductor wafers which includes satellite reaction chambers 60, 62, 64, and 66 disposed around the periphery of central chamber 14, see figure 1. A robot assembly 16 comprising arms 18, 20, and 22 is disposed in central chamber 14. Assembly 16 moves the substrate 12 to any position within the apparatus. Begin lacks anticipation only of disclosing that reaction chambers 60, 62, 64, and 66 comprise an irradiation chamber and a vacuum apparatus. However, apparatuses used for depositing an amorphous silicon layer, for irradiating an amorphous silicon layer for dehalogenating and hydrogenating the layer, for etching and plasma doping the layer are all well known in the art, see Miyachi et al., Kawasaki et al., and Nakayama et al., respectively. In light of the

disclosure of Pressley, it would have been obvious to one skilled in the art to use a laser beam having a rectangular form which permits uniform irradiation in the known apparatus of Miyachi et al. and to move the substrates with respect to the laser beam.

Codama discloses a method of fabricating a thin film transistor which includes the steps of depositing an amorphous silicon, etching the silicon layer, the gate layer, and the gate insulating layer, plasma doping the silicon layer to form source and drain regions, see column 1, lines 42-46, and hydrogenating the silicon layer. Therefore, in light of the semiconductor device process disclosed by Codama, it would have been obvious to the skilled artisan to include the necessary processing chambers required to practice the method of Codama on the known apparatus of Begin et al.

Claim Rejections - 35 USC § 112

Claims 8-15, 21-23, 27-29, 41, 42, and 44-46 are rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In claim 8, lines 8-11 are confusing. Specifically, it is unclear what is meant by “a length of said laser light is longer than *a length of said substrate on a surface of said semiconductor*”. Likewise, in claim 27, lines 8-11 are confusing. Specifically, it is unclear what is meant by “a length of said laser light is longer than *a length of said substrate on a surface of said object*”. Likewise, in claim 41, in lines 9-12, and in claims 42 and 44-46, in

Serial Number: 08/330,797
Art Unit: 1107

lines 10 -13, it is unclear what is meant by "a length of said laser light is longer than *a length of said substrate on a surface of said substrate.*"

Response to Arguments

Applicant's arguments with respect to claims 8-15, 21-23, 27-29, 41, 42, and 44-54 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

The additionally cited references disclose the use laser beams with rectangular cross-sections in the processing of semiconductors.

Any inquiry concerning this communication should be directed to Mary Wilczewski at telephone number (703) 308-2771.

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